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College of Tropical Agriculture & Human Resources
University of Hawaii at Manoa

Hawaii's Pollution Prevention Information
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HAPPI-Farm 5

Minimizing Pollution Risk from
Pest Management

Chemical pesticides are often used to control pests. These products must be applied, handled, and stored safely to protect people and prevent pollution. Safe practices include:

- application practices that ensure applying the correct amount of the right pesticide to address the pest problem
- proper handling practices during mixing, loading, and application
- appropriate storage and disposal practices.

Many pesticides are toxic to fish and other aquatic life. Many are also toxic to humans. When found in water supplies, pesticides normally are not concentrated enough to cause immediate health effects. Instead, pesticides often occur as pollutants in very small amounts. Some pesticides accumulate in the body, which may cause future health problems like cancer and birth defects from prolonged exposure. Following proper pesticide application, handling, storage, and disposal procedures will greatly reduce the risks from pesticides to you and the environment.

This worksheet will provide you with information on pest management planning and proper pesticide use. It will also help you to assess the water pollution risks from your activities and to develop an action plan to establish practices that reduce pollution risks. Additional information on the proper use of pesticides can obtained from your local CTAHR Cooperative Extension Service (CES) office or from the Pesticides Branch of the Hawaii Department of Agriculture (see the Web site <http://www.hawaiiag.org/hdoa/>). HDOA-PB can be contacted by phone at 808-973-9401 or by mail at P.O. Box 22159, Honolulu, HI 96823-2159.

Integrated pest management

Integrated pest management (IPM) is an effective and environmentally friendly way to manage pests. Pesticides are most effective and have the lowest risk of causing water pollution if they are used as part of an IPM program in which regular monitoring of pests results in applying pesticides only when necessary. Nonchemical pest management strategies and tactics involving cultural practices, crop nutrition, and biological controls are also used when appropriate. Applying pesticides on a regular basis whether pests are present or not, sometimes called "calendar spraying," may result in too much pesticide being applied and may build up pest resistance to pesticides.

CES personnel, crop consultants, and other pest experts who know the problems typical with your crops can help you learn how to use IPM. You can also reduce water pollution risks by using pesticides only when pests are present and are significantly decreasing crop yields. When you have a pest problem, identify the pest and purchase the specific pesticide that will address that problem. CTAHR has developed a set of Web-based resources called Knowledge Master (<http://www.extento.hawaii.edu/>) to help you with pest management.

Read the label

The most important thing you can do to reduce pollution risks from pesticides is to *READ THE LABEL* every time before you buy, apply, or store a pesticide. Additional information is provided in CTAHR publication WC-3, *Before you buy or apply an herbicide*. The law requires you to follow label directions when you use a pesticide. The label will help you decide if it is the cor-

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rect product to meet your needs. It will also tell you how to mix, apply, and store the product.

The label provides information on the relative toxicity of the product. Chemicals labeled CAUTION have relatively low toxicity. Chemicals labeled WARNING have moderate toxicity. Chemicals labeled DANGER have high toxicity. The equipment you need to mix and apply the product, including personal protective equipment, will depend on the individual chemical and the toxicity. Be sure that you have the appropriate equipment to mix and apply the product before you purchase it. The label also contains information about application hazards, how long you must keep people and animals away from the application site, and first aid.

However, the label may not provide all the information you need. If you need more information, ask your pesticide dealer or retailer for a copy of the Materials Safety Data Sheet (MSDS). Copies of the MSDS for many common pesticides can also be found on the Web at <http://www.cdms.net/manuf/manug.asp>. If you have additional questions, ask your pesticide dealer or distributor, your local CES agent, or the CTAHR pest management specialists at UH-Manoa (see the Contact Information Sheet for your island). You can also obtain information directly from the pesticide manufacturer by calling the toll-free number provided on the label.

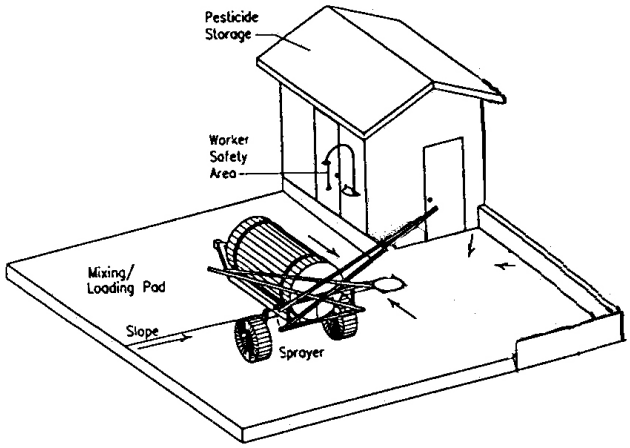
Agricultural pesticide users who employ others on their farm must also comply with federal Worker Protection Standards* designed to protect farm workers. People who violate these standards can face severe penalties including large fines and jail time. These regulations are covered in current pesticide applicator training programs.

Pesticide applicator training

Hawaii state law requires that you obtain a license in order to apply restricted use pesticides. However, if you are applying any pesticides, consider taking private applicator training even if you do not need to obtain license certification. Periodic trainings are conducted on all islands by CTAHR personnel. Contact the Agricultural Diagnostic Service Center (phone 808-956-6706; fax 808-956-2592), your local CES office, or the CTAHR Web page <http://pestworld.stjohn. hawaii.edu/epp/pat.html> for information on how to register for pesticide applicator training.

Mixing and loading pesticides

Mix and load pesticides where spills will not easily enter groundwater or surface water bodies. This risk is least if you mix and load pesticides on a well constructed concrete pad or if you mix in the field and load with a nurse tank. Be prepared to deal with spills by following the "3 Cs" of spill management: control, contain, and clean up. Control the spill by stopping additional pesticides from spilling out of the container. Second, keep it from spreading. Then, clean it up according to the directions on the pesticide label or on the Materials Safety Data Sheet. Be sure that you have the proper equipment on hand, including personal protective equipment, before you try to clean up any chemical spill. If you do not



*For more information, see EPA publication 735-B-93-001, *The Worker Protection Standard for Agricultural Pesticides—How to Comply*, available on the web at <http://www.cdc.gov/niosh/nasd/docs/ep00100.html> or by mail from Superintendent of Documents, U.S. Government Printing Office, Mail Stop: SSOP, Washington, DC 20402-9328.

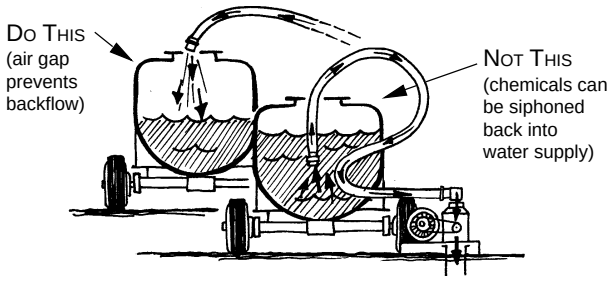
have the appropriate equipment, or if there is any risk of the spill entering a water body (including a storm drain) or otherwise posing risk to the public, call the Hawaii Department of Health Chemical Spill Hotline during weekday business hours at 586-4249 (Oahu), 974-4000 ext. 64249 (Hawaii), 274-3141 ext. 64249 (Kauai), 984-2400 ext. 64249 (Maui), 1-800-468-4644 (Molokai, Lanai); the 24-hour number for all islands is 808-247-2191. In any emergency situation, call 911.

Filling your sprayer tank

Improperly filling your sprayer tank can place your drinking water and groundwater at risk. You are responsible for the proper mixing and loading of all the pesticides you use. Be sure to check the pesticide label or MSDS for any special mixing requirements.

When a sprayer tank is left unattended, it increases the risk of contamination from spills or overfilling. Careful loading and mixing of pesticides will reduce the risk to ground and surface waters.

Filling your sprayer directly from your drinking water supply system is not recommended because it increases water contamination risk from back-siphoning. Back-siphoning is when the flow of water is reversed, possibly taking some of the pesticide back into the well or water supply system. To greatly reduce the risk of back-siphoning, keep your water hose or pipe above the level of the pesticide mixture—this is called maintaining an air gap—to prevent water and pesticides from being drawn back into your water supply if the pump fails or is shut off.



Use a back-siphoning prevention device or check-valve when filling a pesticide tank. These can be found at farm supply stores, hardware stores, and irrigation supply outlets. They are relatively inexpensive and reduce the risk of water contamination.

Rinsing your sprayer tank

After pesticide applications, clean all equipment. Cleaning should be done away from your drinking water supply system and surface water bodies such as streams and ditches. The rinse water should be used in the next spray mix, or it should be applied to the field you just finished spraying. A clean water tank or nurse tank on the sprayer is a convenient way to have clean water in the field to wash out your sprayer.

Do not apply pesticides near streams or other water bodies

Pesticides applied to field areas next to streams, or pesticide spray that drifts off of the field, can contaminate surface waters. Avoid spraying pesticides within 100 feet of a stream or other water body to lower the risk of water pollution. Planting vegetation along streams can help filter pollutants.

Sprayer calibration

The use of calibrated equipment is important. Calibrating your equipment will reduce nonuniform coverage and ensure that you are applying the appropriate amount of pesticide for the intended purpose. Before calibrating your sprayer, make sure your equipment can apply the product according to the rate recommended on the label. Each spray nozzle should apply amounts within 5 percent of the specified volume.

Pesticide storage

If stored correctly in a well designed and secure location, pesticides can be safely stored on your farm with a very low risk of water pollution. However, because small amounts of some chemicals may pose a significant hazard to ground and surface waters, it is very important that you follow correct pesticide storage and disposal practices.

Containment is very important in the event of an accidental spill. Separately storing pesticides and fertilizers can minimize the chance of incompatible materials mixing in the event of a spill. Also, pesticides with strong vapors should be stored separately because they could contaminate other pesticides, making them useless. The floor of the storage site should be made of sealed concrete or some other easily cleaned, nonpermeable material and should hold a minimum of 125 percent of the total volume stored. Carpeting, wood, soil,

and other absorbent floors should not be used because they are difficult or impossible to decontaminate in the case of a leak or spill. For easier clean-up, shelving and pallets should be made of nonabsorbent material such as plastic or metal. If wood or fiberboard materials are used, they should be coated or covered with plastic, polyurethane, or epoxy paint.

The storage facility should be located as far as reasonably possible from streams and other water bodies and in an area with a very low risk of flooding. If you store pesticides on a regular basis, you may want to consider building a designated storage building with a concrete floor, secondary containment, and a temperature and humidity controlled environment. In all cases, make sure your pesticides are locked up-protected from theft and secured from children and animals.

Pesticide containers

A major concern about the condition of pesticide containers is the potential for leaks and spills. If you have containers that are rusting or have holes or tears, the pesticide should be used or disposed of immediately. Storing the containers off the ground helps to prevent rusting and reduces the potential for direct contamination. Be careful to keep all pesticides in their original containers with their proper labels. The pesticide label contains important information about proper cleanup, disposal, and emergency action if the pesticide is spilled or leaked. You may also want to keep a copy of the Materials Safety Data Sheet for any pesticides that you store, because it contains more detailed and comprehensive information than can fit on the product label.

Disposal of pesticides and pesticide containers

Unused pesticides present a potential danger. You can avoid the problem by purchasing pesticides in small amounts as needed. If you have unused materials, follow the guidelines provided by the Hawaii Department of Agriculture: use up the pesticide following label directions or, if you are not able to use the pesticide, it must be treated as a hazardous waste. Contact HDOA's Pesticide Branch at 808-973-9401, the Hawaii Department of Health's Hazardous Waste Program at 808-586-4226, or your local county waste management program (see the Contact Information Sheet for your island). DO NOT dispose of the pesticide at a landfill, pour it down the drain, or dump it anywhere.

Don't let this happen! Dispose of pesticide containers properly.

Recycling empty pesticide containers poses the least risk of water pollution. If they cannot be recycled, rinse them at least three times ("triple-rinse") and puncture or otherwise destroy the packaging to prevent accidental reuse prior to disposal as solid waste. One way to reduce waste is to add the rinse water to a tank mixture that contains the same product, instead of disposing it down the drain. Some containers can also be returned to the dealer, manufacturer, or formulator to be reconditioned or reused-check with the pesticide dealer or distributor.

Assessing your risks

Complete the risk assessment table at right to determine your water pollution risks. For each category, choose the set of practices that best fits your situation. Then, go to page 6 and develop an action plan to minimize water pollution on your land.

Risk Assessment Table for Pest Management

	Low risk	Moderate risk	High risk	Your risk
IPM plan and pesticide selection	Have an up-to-date IPM plan	Have an IPM plan that is >3 years old, or use pesticides according to IPM principles but without a written plan	No IPM plan, or don't apply pesticides according to IPM principles	❑ low ❑ moderate ❑ high
Read the label	Always read the label and follow label directions	Sometimes read the label and follow the directions	Seldom or never read the label and follow directions	❑ low ❑ moderate ❑ high
Applicator training	Have completed applicator training within the past 3–5 years	Completed training >5 years ago, or only apply low-toxicity pesticides	No training and apply moderate- and high-toxicity pesticides	❑ low ❑ moderate ❑ high
Application practices (mix/apply/rinse)	Always mix and load on concrete pad with spill barrier, always main-tain air gap, have check valves on water sources	Mix and load in field, closely monitor sprayer filling to maintain air gap	Mix and load near water source or water body, don't closely monitor filling	❑ low ❑ moderate ❑ high
Application practices (location)	No pesticides applied within 100 ft of stream or other water body	A few pesticides applied within 100 ft of water bodies with small sprayer	Pesticides often sprayed within 100 ft of water body	❑ low ❑ moderate ❑ high
Planted areas	Have continuous planted areas between all fields and stream areas	Have vegetative buffers between some fields and streams, or buffers have breaks in them	Few or no vegetative buffers between fields and streams	❑ low ❑ moderate ❑ high
Equipment maintenance and calibration	Application equipment is regularly maintained and calibrated	Equipment is well maintained but has not been calibrated during this cropping season	Equipment is poorly maintained or has not been calibrated in two or more cropping seasons	❑ low ❑ moderate ❑ high
Pesticide storage location	Pesticides stored in a secure area with concrete floor and spill barrier, or, no pesticides stored	Pesticides stored in secured area with concrete floor but no spill barrier	Pesticides stored in an unsecured area or in an area with a nonconcrete floor	❑ low ❑ moderate ❑ high
Pesticide storage containers	Pesticides stored in original packaging that is in good condition	Pesticides stored in original packaging that is in fair condition	Pesticides not stored in original packaging or stored in original packaging in poor condition	❑ low ❑ moderate ❑ high
Disposal of pesticides and pesticide containers	Unwanted pesticides used up; containers recycled	Used pesticides disposed as hazardous waste; containers triple-rinsed and disposed as solid waste	Unused pesticides and used containers not disposed of properly	❑ low ❑ moderate ❑ high

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items:		
Have never had training in pesticide application methods and safety	*Contact the local CES office and register for the next pesticide applicator training.*	*By the end of next week*

This HAPPI document was adapted by Michael Robotham, Carl Evensen, and Linda J. Cox from *Protecting your resources through a farm & home assessment* produced by the National Farm•A•Syst / Home•A•Syst Program Office; Gary Jackson, Coordinator; Madison, Wisconsin. HAPPI-Farm materials are produced by the Hawaii's Pollution Prevention Information (HAPPI) project (Farm•A•Syst / Home•A•Syst for Hawaii) of the University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR) and the USDA Cooperative Extension Service (USDA-CES). Funding for the program is provided by a U.S. EPA 319(h) grant administered by the Hawaii State Department of Health. Comments and suggestions from Patricia Macomber, Geeta Rijal, and Verne Wood contributed to this document.